REMARKS

The Office Action dated November 16, 2006, has been received and carefully noted. The above amendments to the specification and claims, and the following remarks, are submitted as a full and complete response thereto.

Claims 13-25 are currently pending in the application, of which claims 13, 24, and 25 are independent claims. Claims 13-25 have been amended to more particularly point out and distinctly claim the invention. No new matter has been added. Claims 13-25 are respectfully submitted for consideration.

The abstract was objected to because it allegedly was not on a separate sheet. The Abstract has been amended, and it is respectfully submitted that the amendments to the abstract render this object moot. Accordingly, it is respectfully requested that this objection be withdrawn.

The specification was objected to as having line spacing "such as to make reading difficult." The Office Action stated that if "space is not already 1½ or double spaced" new application papers are required. Reviewing the papers that were filed, Applicant respectfully submits that the originally filed application was 1½ spaced. Furthermore, Applicant notes that this application has been published by the USPTO as U.S. Patent Application Publication No. 2005/0102301, and the text of the application is available on

the internet through the USPTO's web site. Thus, the written description of the present application is electronically available for the Examiner's convenience. It is respectfully submitted that, since the specification was filed in compliance with the applicable rules, no substitute specification should be required. Therefore, it is respectfully requested that this is objection be withdrawn.

Claim 25 was rejected under 35 U.S.C. 101, as not relating to statutory subject matter. The Office Action stated that the claim lacks the necessary physical articles or objects to constitute a machine or a manufacture. Thus, the Office Action concluded that the claim simply recites functional descriptive material. Applicant respectfully traverses this rejection.

Claim 25 recites, "A computer system" with various elements. A computer system is, quite clearly, a machine and thus is statutory subject matter. The elements are described in means-plus-function terminology, which is authorized by 35 U.S.C. 112, sixth paragraph. Accordingly, Applicant respectfully submits that claim 25 properly claims statutory subject, in the form of a computer system having various functional elements. Accordingly, Applicant respectfully requests that that this rejection be withdrawn.

Claims 13-25 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,809,490 of Guiver et al. ("Guiver") in view of U.S. Patent No. 6,226,408 of Sirosh ("Sirosh"). The Office Action took the position that Guiver discloses some of the features of the independent claims, and cited Sirosh for the remaining features of the independent claims. Applicant respectfully submits that the claims recite subject matter that is neither disclosed nor suggested in the combination of Guiver and Sirosh.

Claim 13, upon which claims 14-23 depend, is directed to a computer-implemented method. The method includes determining cluster centers in a first data structure, wherein the first data structure comprises a lattice structure of weight vectors that create an approximate representation of a plurality of input data points. The method also includes performing a first iterative process for iteratively updating the weight vectors such that the weight vectors move toward the cluster centers. The method further includes performing a second iterative process for iteratively updating a second data structure utilizing results of the iterative updating of the first data structure. The method additionally includes determining, based on the second data structure, several sets of weight vectors in said lattice structure such that in each set, the weight vectors correspond to the same cluster centers of the input data points. The method is an unsupervised method that is configured to be suitable for an on-line system.

Claim 24 is directed to a computer-readable program product comprising a computer program code embodied on a computer-readable medium, wherein executing the computer program code in a computer causes the computer to carry out a method. The method includes determining cluster centers in a first data structure, wherein the first data structure comprises a lattice structure of weight vectors that create an approximate representation of a plurality of input data points. The method also includes performing a first iterative process for iteratively updating the weight vectors such that the weight vectors move toward the cluster centers. The method further includes performing a second iterative process for iteratively updating a second data structure utilizing results of the iterative updating of the first data structure. The method additionally includes determining, based on the second data structure, several sets of weight vectors in said lattice structure such that in each set, the weight vectors correspond to the same cluster centers of the input data points. The executing the computer program is configured to carry out an unsupervised method that is configured to be suitable for an on-line system.

Claim 25 is directed to a computer system including first determination means for determining cluster centers in a first data structure, wherein the first data structure comprises a lattice structure of weight vectors that create an approximate representation of a plurality of input data points. The computer system also includes first performance means for performing a first iterative process for iteratively updating the weight vectors such that the weight vectors move toward the cluster centers. The computer system

further includes second performance means for performing a second iterative process for iteratively updating a second data structure utilizing results of the iterative updating of the first data structure. The computer system additionally includes second determination means for determining, based on the second data structure, several sets of weight vectors in said lattice structure such that in each set, the weight vectors correspond to the same cluster centers of the input data points. The computer system is configured to operate using an unsupervised method that is configured to be suitable for an on-line system.

Certain embodiments of the present invention provide critical and unobvious advantages over the prior art of record. For example, in certain embodiments of the present invention only one pass through the dataset (*i.e.* epoch) is required. This single pass capability can be especially advantageous when dealing with very large datasets.

Applicant respectfully submits that the combination of Guiver and Sirosh fails to disclose or suggest all of the elements of any of the presently pending claims, and, therefore, fails to provide the above-identified critical and unobvious advantages.

Guiver generally relates to an apparatus and method for selecting a working data set for model development. At column 2, lines 19-21, Guiver explains that it provides a data selection apparatus that augments a set of training examples with the desired output data. Accordingly, Guiver's system is a system of supervised classification, not

unsupervised classification, in the sense that, in Guiver, the desired output of the input is added to the input data sample before clustering.

It is readily apparent that Guiver is not proposing a new approach to clustering, but is using classical clustering algorithms to do this. In fact, the use of the term "SOM clusterizer" in Guiver is incorrect, or at least irregular, because the SOM's intended use is as a topology-preserving vector-quantization algorithm. From Sirosh, however, one of ordinary skill in the art would recognize that Guiver will not be able to find nonlinear data clusters in Guiver's data sets using the classical methods (*e.g.* SOM and K-means) proposed in Guiver.

Sirosh generally relates to unsupervised identification of nonlinear data clusters in multi-dimensional data. Sirosh, at column 1, lines 17-19, explains that supervised classification is classification in which training data containing example of known categories are presented to a learning mechanism, which then learns one or more sets of relationships, and which can then handle new data as it comes in. Sirosh asserts, at column 1, lines 27-28, that supervised classification is not useful for certain applications.

Thus, at column 2, lines 6-59, Sirosh explains that it provides an unsupervised learning technique that combines clustering/vector quantization and data encoding based on proximity and connectedness of the data distribution. Sirosh begins with an unordered

collection of vectors and outputs a clustering of such vectors into relatively disjoint clusters. Then Sirosh performs a hierarchical layering of clusters that results in increasing larger clusters that are not necessarily linear in the data space. Sirosh explains that its invention is particularly suitable to large data mining operations in multidimensional real-world data. The approach that Sirosh proposes is essentially a modified version of the K-Means approach, which Sirosh refers to as the BaNG algorithm.

In a K-means approach, as described by Sirosh (see column 6, lines 13-22), each center represents a single cluster, which is why K-means is used by Sirosh. The K-Means cannot be used to cluster nonlinear clusters, as would be immediately recognized by one of ordinary skill in the art. In the case of the BaNG algorithm (see column 6, lines 46-47 *et seq.*) as employed by Sirosh, the BaNG algorithm is a clustering algorithm in which each weight vector represents a cluster center and is only different from K-Means in the way explained by Sirosh in the cited columns. In other words, neither of these algorithms (K-means or BaNG) provides a mechanism to weight-vectors together so that several weight vectors represent a single (nonlinear) cluster.

Claim 13 recites, among other things, "determining, based on the second data structure, several sets of weight vectors in said lattice structure such that in each set, the weight vectors correspond to the same cluster centers of the input data points." Applicant

respectfully submits that Sirosh fails to disclose or suggest at least this feature of the claims.

The Office Action cited column 6, lines 22-26, and column 6, line 46, to column 7, line 33, as disclosing the feature "determining, based on the second data structure, several sets of weight vectors in said lattice structure such that in each set, the weight vectors correspond to the same cluster centers of the input data points." Applicant respectfully disagrees with the Office Action's analysis.

The cited portion of Sirosh is part of Sirosh's "Vector Quantization," which is one of three processes that Sirosh implements at each layer or stage of its hierarchy, as can be seen from column 4, line 64, to column 5, line 12. Furthermore, the fact that the cited discussion relates to the "Vector Quantization" process can be seen from the heading "Vector Quantization" at column 5, line 50.

Sirosh's "Vector Quantization" does not produce a result "such that in each set, the weight vectors correspond to the same cluster centers of the input data points." Instead, as Sirosh explains at column 7, lines 34-37, the operations cited by the Office Action normalize the location of the cluster center in the vector space, accounting for the influence or contribution of all of the input vectors and not merely those that are closest to the cluster center.

In other words, the function of Sirosh's vector-quantization is the same as the function of the SOM: it provides a topologically ordered vector quantization of the data space. Sirosh's vector-quantization does not provide the clusters.

Furthermore, claim 13 recites "wherein the method is an unsupervised method that is configured to be suitable for an on-line system." This recitation is supported in the original specification at page 16, lines 24-32 (See also: page 1, lines 1-3; page 1, line 32, to page 2, line 2; page 5, lines 19-21; page 7, line 17 et seq.; and page 16, lines 13-15).

As noted above, Guiver can be described as a supervised method, and Guiver would not work as intended if it were converted from supervised to unsupervised, because Guiver relies on a training sequence for initialization. Accordingly, Applicant respectfully submits that the combination proposed in the Office Action is *per se* non-obvious, because the combination would render Guiver unsuitable for its intended purpose.

MPEP 2143.01(V) states "THE PROPOSED MODIFICATION CANNOT RENDER THE PRIOR ART UNSATISFACTORY FOR ITS INTENDED PURPOSE," (Capital letters in original.) and explains that "If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no

suggestion or motivation to make the proposed modification." Moreover, MPEP 2145(III) states that "the claimed combination cannot change the principle of operation of the primary reference or render the reference inoperable for its intended purpose." The proposed combination would fundamentally alter the principles of operation of Guiver, rendering Guiver unsatisfactory for its intended purpose. Thus, the MPEP indicates that the proposed modification of Guiver is improper. For this further reason, it is respectfully requested that the rejection of claim 13 be withdrawn.

Furthermore, Applicant respectfully traverses the Office Action's position that it would have been obvious to combine Guiver and Sirosh. The Office Action took the position that both Guiver and Sirosh disclose unsupervised clustering. However, as explained above, Guiver involves supervised categorizing, utilizing a training example, and not unsupervised categorizing. Compare Sirosh, column 1, lines 17-19, "In supervised classification, training data containing examples of known categories are presented to a learning mechanism," with Guiver, column 2, lines 19-21, "The present invention provides a data selection apparatus which augments a set of training examples with the desired output data." Accordingly, the factual basis upon which the Office Action sought to establish motivation to combine actually contradicts the proposed motivation to combine.

Moreover, the Office Action asserted that the combination would "more accurately identify cluster centers." However, the Office Action did not cite any evidence in support of this assertion, and it is unclear what type of accuracy the Office Action has in mind. Without the citation of evidence and without explanation, it appears that the Office Action reflects attempted improper hindsight reconstruction of the claim recitations, without motivation for such reconstruction existing in the prior art, either in the references themselves or in the knowledge of one of ordinary skill in the art.

It is insufficient to merely identify each element in the prior art to establish unpatentability of the combined subject matter as a whole. Instead, the reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious must be articulated. *Abbott Labs. v. Andrx Pharm., Inc.*, 452 F.3d 1331, 1336 (Fed. Cir. 2006). In the present rejection, one of the alleged reasons for motivation to combine is clearly mistaken, and the other reason is both vague and without evidence.

To protect against such invalid and inappropriate hindsight reconstruction, the Federal Circuit has ruled that references cannot be selected, and selected elements from selected references cannot be combined, without some suggestion, motivation, or teaching that would render obvious that selection and that combination. *See, e.g.*, *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1385, 58 USPQ2d 1286, 1293

(Fed. Cir. 2001) ("In holding an invention obvious in view of a combination of references, there must be some suggestion, motivation, or teaching in the prior art that would have led a person of ordinary skill in the art to select the references and combine them in the way that would produce the claimed invention."); and *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1124-25 (Fed. Cir. 2000) ("a showing of a suggestion, teaching, or motivation to combine the prior art references is an 'essential component of an obviousness holding'").

As noted above, the Office Action asserted that it would have been obvious to combine the references to "more accurately identify cluster centers." The Office Action did not provide any citation for this alleged motivation, and the alleged motivation does not come from the cited references. Applicant, therefore, respectfully traverses the Office Action's assertion of motivation to combine the references, because it is not based on evidence. The only basis of record for producing what is claimed is the present application. Using the present application as the basis for combination, however, is improper hindsight reconstruction. Accordingly, for this additional reason, Applicant respectfully requests that the rejection be withdrawn.

Additionally, as noted above, Sirosh disparages supervised categorization as being "not useful" for the sorts of applications to which Sirosh is directed (Sirosh, column 1, lines 26-29). Accordingly, Sirosh expressly teaches away from combination between its

own technique and the supervised technique of Guiver. Thus, Applicant respectfully submits that the evidence of record shows that the proposed combination of Guiver and Sirosh is not obvious, because it is contrary to the conventional thinking reflected in the disclosure of Sirosh. Applicant respectfully submits that this evidence of teaching away provides a further basis for withdrawing the rejection. Appropriate withdrawal of the rejection is respectfully requested.

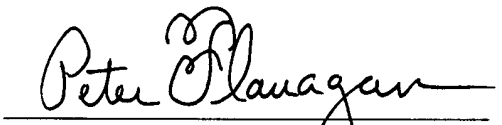
Claims 24 and 25 each have their own scope, but each contain recitations similar to those discussed above with regard to claim 13. Similarly, claims 14-23 depend from, and further limit, claim 13. It is, therefore, respectfully submitted that each of claims 14-25 recites subject matter that is neither disclosed nor suggested in the improper combination of Guiver and Sirosh, and withdrawal of the rejection of claims 14-25 is respectfully requested.

For all of the reasons explained above, it is respectfully submitted that each of claims 13-25 recites subject matter that is neither disclosed nor suggested in the prior art of record, and that the proposed combination of references is legally improper. It is, thus, respectfully requested that all of claims 13-25 be allowed, and that this application be passed to issue.

If, for any reason, the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, Applicant's undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, Applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,



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